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CLINICAL MEDICINE

FEBRUARY
1949
VOLUME 56
NO. 2

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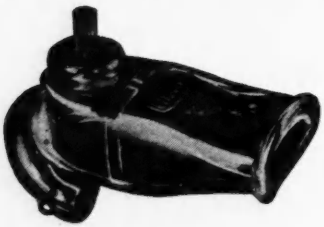

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Editorial

The Discovery of Insulin

It seems worthwhile, if only for sentimental reasons, to remind physicians that 1949 represents the 27th anniversary of the discovery of insulin and to briefly outline the inspiring career of Frederick Banting, whose premature death in an aircraft accident in February 1941 was an irreparable loss to medical science. As was stated in an obituary shortly after his death, "Banting's whole working life was a striking example of how all obstacles can be overcome by pluck, tenacity of purpose, and the possession of first class brains, reinforced by a sound constitution and great physical strength."

Frederick Grant Banting was born at Alliston, Ontario, in 1892 and he was educated at the University of Toronto from whence he obtained his degree in medicine in 1916. After military service with the Canadian Army in World War I, he practiced as an orthopedist in London, Ontario, and later was appointed demonstrator in physiology at the University of Western Ontario. His curiosity over extracting the active principle of the islands of Langerhans, the hypothetical insulin of Sharpey-Schaefer, was so great that he went to the laboratory of Professor J. J. R. Macleod in Toronto and, with Charles H. Best, a second year medical student, tackled the problem. Within a period of eight months or so they had discovered insulin. Their classical report was made in *The Journal of Laboratory and Clinical Medicine*, vii, 265, 1922, and a selection, including the conclusions, from this paper can be found in Ralph H. Major's "Classic Descriptions of Disease" (Chas. Thomas, 3rd. ed., 1945).

The Nobel Prize for medicine in 1923 was divided between Banting and Macleod, the former only 31 years of age and the youngest man to have been awarded the Nobel Prize.

The obituary concludes "Of him it may be said that he was a genius who worked for humanity. His great brain power was devoted to the saving and not the destroying of life. He was a hero of medical science who may be ranked with men like Pasteur, whose aim in life was to devise means to save life, to make life more comfortable and pleasant."

That the role of Charles H. Best in the discovery of insulin was not just "a flash-in-the-pan" by an unknown m·dical student who thereafter lapsed into obscurity is attested by the facts. Best, Professor and Head of the Department of Physiology, Associate Director of the Connaught Laboratories, Research Associate in the Banting-Best Department of Medical Research, University of Toronto, is the senior author of the internationally famous "Physiological Basis of Medical Practice," undoubtedly one of the most popular medical books of today.—CHARLES D. MARPLE, M.D.

General Office Practice

The modern physician's office must be clean, comfortable, cheerful, practical, orderly, and efficiently arranged. There should be comfortable chairs in the waiting room, a few pleasing pictures on the wall, fresh magazines on the table, convenient ash trays, and a practical rack for patient's hats and coats.

One or two small chairs and a few unbreakable trinkets for the kiddies make a big hit with the mothers as well as the children.

The first impression the new patient gets of the doctor is in studying the reception room during his one to three hour wait. The second impression he gets is of the office attendant during that wait. The physician himself comes third on the list, and if the first two are not pleasing and favorably impressive, we as doctors run a poor third and are sometimes scratched.

The office help must be clean, neat in dress, conservative in habits, pleasant but not frivolous or gushing, kindly sympathetic but not melodramatic, alert but not jittery, friendly but not fresh, intelligent but not highbrow, pleasing appearance and personality but not glamorous. She must have ears that hear all and a curb on her tongue.

We usually train our own office attendants. We may select a widow in her forties, or a girl who has passed the boy-crazy age. High school graduation and stenographic training are essential. A year or two in college makes her even better.

A spare office attendant is a good investment. Do not hire relatives, daughters, or sisters of patients, or your girl friend.

As regards special equipment, do not purchase it, unless you have frequent use for it, plenty of space to put it in, and someone capable of operating it.

A small portable x-ray is valuable assistance to a busy practitioner providing he limits his field and does not try to do everything with it. If your x-ray equipment is not shock proof, sell it, or treble your liability insurance today.

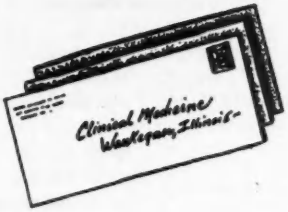
The public no longer fears the needle. Parenteral therapy is definitely more rapid in action and more effective therapeutically. The successful general practitioner now has a battery of sterile syringes and needles on hand at all times and many different kinds of ampules in his wall case and refrigerator.

Office or medical gynecology is a vast but neglected field of the general practitioner. Trichomonas vaginalis should be inspected and treated instead of prescribing some douche powder. An eroded, neglected cervix should be examined and treated before it becomes a carcinoma.

Many patients with glandular diseases enter the doctor's office. They should be identified and treated, or referred to the specialist.

Most practitioners have too much to do or try to do too much. It is a wise doctor who recognizes his own limitations of ability and does not try to do everything.

To have and to hold a successful practice, the general practitioner most constantly study new and improved methods of treatment. A completely written case history and a thorough physical examination are especially essential. He should inspire confidence by his frankness and honesty. He should never make a snap diagnosis or bluff an opinion. If he is unable to make a logical diagnosis, he should frankly tell the patient that he wishes to give the case further study. *We might all take a lesson from the attorney who seldom makes a statement or renders an opinion without looking in a book.*—A. P. Hauss, M.D. (New Albany, Ind.) in *Irnl. Indiana S. M. A.*, Oct. 1946.



Original Articles

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Varicose Veins

By F. B. BOWMAN, M.B., F.R.C.P. (Can.), Hamilton, Ont.

SO MUCH has been written about the diagnosis and treatment of varicose veins that one hesitates to even attempt to add anything to the literature on the subject. The injection treatment of varicose veins in properly selected cases is one of the most gratifying procedures from both the patients and physicians standpoint, yet one encounters individuals discouraged and even disgusted with the results attained after being promised a satisfactory outcome.

In 1933 the statement was made by the author in a brief report that advertising literature had made the injection treatment seem such a simple procedure that inexperienced men were handling cases carelessly and thus casting ill-repute on a very simple and satisfactory treatment of a very common and disabling complaint. The condition is comparatively common for it has been shown that about 10% of the adult population have varicose veins.

Authors on the other hand have published and emphasized methods of diagnosis so complicated and involved that the busy practitioner has not the time nor the patience to attempt them and thus many people continue to carry on with unsightly and disabling conditions in the extremities caused by varicose veins.

There is no question but that saphenous vein ligation or resection is very satisfactory in selected cases, but it certainly is not an office procedure, as some would have us believe but must be performed with a meticulous technique comparable to herniotomy. There is also no question but that many patients are subjected to saphenous ligation who might well be treated by injection.

The following remarks regarding diagnosis and treatment may encourage many to handle these patients more carefully and perhaps be a deterrent to those who suggest resection in practically all cases of varicose veins.

Diagnosis

Many insist on five tests before treatmen of any kind is attempted. These are as follows: 1. Schwartz test. (Percussion). 2. Perthés test. 3. Compression test. 4. Comparative tourniquet test. (Ochsner and Mahoner). 5. Brodie-Trendelenberg test.

All that one requires to know is whether there is incompetency at the sapheno-femoral junction and whether

or not any communicating veins below the level of the tourniquet are present. This may be shown by the Brodie-Trendelenberg test, and *all other tests may be discarded.*

Technique of Brodie-Trendelenberg Tests

1. The leg is elevated until the veins are emptied.

2. A tourniquet is applied in the upper thigh to constrict the saphenous but not the femoral vein.

3. The patient stands upright and the degree of filling is noted with and without the tourniquet.

Interpretation

The test is: —

Negative. If the veins fill within 30 seconds and do not become more distended when the tourniquet is removed. *Positive.* If the veins remain collapsed throughout a 30 second period and then suddenly fill when the tourniquet is removed. *Doubly Positive.* If before the tourniquet is removed the veins distend rapidly and then when it is removed distend still more.

As a result of the above test one knows, 1st. Whether there is retrograde flow of blood through the saphenofemoral junction. 2nd. Whether there are communicating veins between the deep and superficial systems. Having taken a few minutes to perform this test one may decide whether a second ligation at a lower level may have to be done.

As a further test a tourniquet may be placed just above the knee which will show whether there is any incompetence of veins above or below that level.

In many years experience the author has never had any complications arise which might be attributed to incompetence of the deep veins. Entirely too much emphasis has been placed on this possibility.

Treatment

The handling of cases of varicose veins requires some thought, and a little more attention to detail than just giving them a few "shots."

A vein treated by injection is devitalized and an ideal host for any infection. Therefore careful inquiry should be made as to any infection elsewhere, e.g., varicose veins should not be injected when the patient has a bad cold, tonsillitis, or a recent influenza. A disabling phlebitis has occurred when an "ulcerated tooth" was present at time of treatment. Certainly a person with any suspicion of phlebitis in a leg with varicose veins, should not be treated until sometime after it has subsided. Age, in itself, is no contraindication to injection therapy.

Personally, I hesitate to advise injection treatment for veins in the thigh, although, if operative treatment is refused injections are not contraindicated, but too much should not be promised. Too many patients *are* promised a cure from ligation. Approximately 80 per cent will require injections following the operation but perhaps not for many months.

Injection Technic

For a number of years I have been using the Bellis-Churney technic for injection. The patient is placed on his back on the table after adjusting the tourniquet above the varicosities. The most distal varicosity is selected, and the needle is inserted at that point. The leg is then raised to an angle of 45 degrees and the sclerosing solution slowly injected. The leg is kept in this position for at least 10 minutes and a crepe bandage is applied from the base of the toes to the knee. Using this technic the vein is flattened as the blood is drained and the intima only is affected. One does not then have to explain the presence of hard, prominent and unsightly hard lumps, which have been caused by the contact of the sclerosant with the blood in the veins. Much smaller amounts may be given when using this technic.

Ligation Technic

There are certain points in the operative procedure which might be emphasized. I always have the patient visit me a day or two before the operation and certain landmarks are marked. With India ink and a sharp needle a small permanent dot may be made where the saphenous vein is to be located, and also any other landmarks lower down. This saves time in the operating room. I prefer a general anaesthetic, such as pentothal sodiuim, and spinal anaesthesia is satisfactory. Most surgeons advise local anesthesia but there is often so much swelling and distortion following this that some of the smaller branches may be missed. Ligation or resection of the saphenous vein without a careful search for branches will guarantee, usually, a poor result. All branches must be searched for, no matter how minute, and ligated. When the saphenous vein is exteriorized it is ligated as high as possible and a forcep applied about 1 inch below this. A section of vein is removed, the upper segment securely ligated and the suture tied into the tissues. A loose ligature is now slipped over the lower segment below the forcep which is now removed and a fine soft rubber urethral catheter inserted as far as possible. It can sometimes be inserted for 10 inches. The leg is now raised to about 45 degrees and the blood drained out of the vein. A syringe is attached to the catheter and the sclerosing solution slowly injected as the catheter is withdrawn. When the catheter is removed the vein is securely tied and the loose end of the suture anchored to the underlying tissue. A crepe bandage is applied from the toes to the knee and the leg is kept elevated for about 20 minutes. The wound is irrigated with saline and mattress sutures of cotton used to close the wound. The patient is allowed to get up the same afternoon and usually may leave the hospital the next day.

The first solution used by the author over 20 years ago was quinine and urethane. An occasional fatal accident was reported by others using this material, and after that for many years 25 per cent lithium salicylate was used by me with satisfactory results. Later on soapy solutions were introduced and have, in my hands, been entirely satisfactory. Those prepared from fish oils may cause alarming allergic reactions. I have found ethylamine oleate, which is prepared from oleic acid, very satisfactory. It causes splendid obliteration, and if by chance any material escapes under the skin there is little danger of any complication. If one wishes to be doubly careful, a small injection may be given the day before the operation and any allergic symptoms noted.

Summary

1. There are too many unsatisfactory results following the injection treatment or ligation and injection of varicose veins.

2. All tests except the Brodie-Trendelenberg may be discarded.

3. The Bellis-Churney method of injection treatment has been satisfactory in my hands.

4. Saphenous vein ligation or resection is not an office procedure and meticulous technique is required.

5. In my experience ethylamineoleate (etalate) has been the best sclerosing solution, and with the fewest side effects.

6. At the best, nearly all patients will require further treatment following ligation and injection.

707 Medical Arts Bldg.

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Diagnostic Error: "Peritonsillar Abscess"

A BOY of 17 was receiving treatment in an Army Hospital for chronic conjunctivitis caused by the staphylococcus aureus. Chill, fever, of 103°F., tachycardia (120), sore throat and headache of 8 hours duration appeared. Pronounced edema of the pillars was present, more marked on the left, with moderate swelling and hard induration in the left submaxillary area. The disease was diagnosed as early peritonsillar abscess.

Despite the intramuscular injection of 50,000 units of penicillin every three hours, the swelling increased and involved the soft palate, and the fever increased to 104°F. An incision in the left peritonsillar area was made but no pus was obtained, at the end of 24 hours. Throat cultures were negative.

At the end of 48 hours, the swelling in the neck and submaxillary region increased and the patient was thought to have a diffuse cellulitis of the neck (Ludwig's angina). An emergency tracheotomy was performed for "respiratory difficulty."

A membrane was first noted in the throat at the end of the third day, and a positive throat culture for diphtheria was not obtained until the end of the fourth day. At this time, there was pronounced edema of the soft palate and fauces, an adherent grey membrane plastered on both fauces, well defined cervical hard swelling and a "bull neck" appearance.

On the fourth day, the patient was given 100,000 units of antitoxin intravenously, with a continuation of the penicillin dosage at 40,000 units per three hours. The cervical edema and swelling began to decrease soon after the antitoxin injection. Despite further antitoxin (100,000 units) and 2,400,000 units of streptomycin, the patient developed heart block and died. (W. J. WALKER, M.D. LT.-COL. F. C. MASSEY,

Fig. 1. Marked edema of the throat apparently due to peritonsillar abscess. This may be diphtheritic in origin.

CAPT. and F. K. MOSTOFI, CAPT. MC. A.U.S. in *The Journal of American Medical Association*, Nov. 22, 1947).

When edema is present with little pain and redness, diphtheritic sore throat should be suspected, whether a throat culture is positive or not. The physician must make the diagnosis of diphtheria and give antitoxin to suspected cases without waiting for the culture. Alexander Joe suggests (The Acute Infectious Fevers, 1947, Blakiston Company publishers) that a Schick test may be of value in questionable cases, if the administration of serum is delayed for 4 hours after the test is given. A positive red Schick Test indicates that the patient is susceptible to diphtheria.

Peritonsillar abscess (quincy) causes severe pain, difficulty in opening the mouth, thick speech, much congestion of the throat and a bulging of the palate.

The "bull neck" appearance may occur in deep cervical cellulitis (Ludwig's angina or deep cervical adenitis of severe diphtheria).

Treatment: Large doses for severe cases must be given intravenously, to obtain quickest effect. Subcutaneous injection requires two to three days before the maximum concentration of the antitoxin in the blood is attained. The intramuscular route is 3 to 6 times as rapid. If the intravenous route cannot be employed, the dose may be given with an ordinary syringe and needle below the umbilicus into the peritoneal cavity.

Fig. 2. The "bull neck" of deep cervical cellulitis (Ludwig's angina) may also be due to severe diphtheria or even to mumps.

There is nothing so easy but that it becomes difficult when you do it with reluctance. — TERENCE.

Which Cough Is Serious?

Question:

We live in a coughing world. Everyone coughs, steadily or interruptedly. Is such a symptom worth anything? Authorities tell us that a cough may be a symptom of pulmonary tuberculosis, cancer of the lung and so on. How can one be alerted to suspect the rare, serious cause of cough?—M.D., Alberta, Can.

Answer:

It is true that in a cigar smoking world, to cough is commonplace. Rienhoff of Johns Hopkins, who has now operated on 500 cases of lung carcinoma, states succintly, *"The cough that is important is the cough that is not normal for that individual."*

The chronic cougher has a routine or pattern of coughing which is characteristic for him. If a new type of cough appears or if a formerly dry cough now results in sputum, that individual must have a chest x-ray, at least.

A carefully taken film will show direct evidence of tuberculosis and indirect evidence of bronchial carcinoma which is obstructing or partially obstructing a bronchus. (infarction, hilar infilitration, occasinally the lesion).

Incidentally, Rienhoff lists the signs of lung carcinoma as: 1. *Cough* in 70 percent of patients; 2. *hemoptysis* in 60 percent; 3. deep, boring, non-pleuritic *pain* in chest; 4. marked *loss of weight* and 5. rarely, hyperpnea, attacks of pneumonitis (beware the diagnosis of of "virus pneumonia",) pneumonia or wheezing.

A Brief Summary and Description of Protamine — Diphtheria Toxoid

By VICTOR ROSS, Ph.D.
Columbia University College of Physicians and Surgeons, New York, N. Y.

PROTAMINE was used both for purification purposes and to precipitate diphtheria toxoid in a form which would, on injection, act as a "depot" from which the toxoid would be liberated gradually.[1] Such slow release acts somewhat in the manner of repeated, small injections.

Reactions are less than with the usual "fluid" or alum-precipitated toxoids as determined by simultaneously injecting the same individuals intradermally with equal amounts of all three. Also subcutaneous injection of 1 cc. quantities of protamine-toxoid and alum-toxoid in two groups of college students showed significantly less reaction with the former. This was expected since the ratio of toxoid to "nitrogen" is considerably more favorable in protamine-toxoid than in "fluid" or alum-toxoid, and "bacillary protein" which is responsible for many instances of reactions caused by the two latter forms of toxoid has been removed in the case of protamine-toxoid. Over 5,000 children have been injected with one or two doses (1 cc) without any disagreeable reaction.

Our data show that 95 per cent of Schick positive children are made Schick negative in three months or less after one injection of protamine-toxoid. Two injections convert practically every child to Schick negative. Recent tests show that 90 to 95 per cent of the children who were originally positive are still negative two years after one injection.[2]

Antitoxin determinations in the blood, which are a more quantitative measure of the response, indicate that protamine-toxoid elicits higher and more durable titers than does alum-toxoid[3].

The references listed below may be consulted for more detailed data.

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Whooping Cough

Question:

Where can I learn about whooping couch, its complications, and treatment?

Answer:

The best information I know of is contained in the book "Whooping Cough" by Lapin. The complete answer to many questions (concerning whooping cough) is not available. There are a number of studies in progress which are trying to answer them. In the meantime, you will find Lapin a good source of our present knowledge.—HATTIE ALEXANDER, M.D., Asst. Professor of Pediatrics, Columbia University College of Physicians and Surgeons, New York City.

Problems in Practice

(CONSULTATION SERVICE)

Precautions in Administering Procaine Penicillin

Question:

I have seen several patients with hard, indurated buttocks after the administration of long acting penicillin. One of these patients needed incision and drainage of a purulent material. How can one be sure of giving adequate doses without such complications? M.D., Iowa.

Answer:

Herrell of the Mayo Clinic has emphasized that the penicillin must be given *deep* into the muscle. "Its administration near the surface or subcutaneously will invariably cause a local redness and, at times, ecchymosis."

The wax preparations cause more reactions than procaine penicillin. More foreign body type of irritation was seen following the use of wax preparations.

Herrell also suggests that one use the 10 cc. ampule rather than the 1 cc. container. "The success of the administration of procaine penicillin depends upon one's ability to deliver an evenly divided suspension of the rather insoluble penicillin in the oil. This is accomplished by shaking the container vigorously . . . this step is greatly facilitated by using the larger vial."

A 19 or 20 gauge needle should be used, together with a locking type of syringe, such as a Luer-Lok, which cannot lose the needle. A quick jab should be given, at right angles to the skin, in the upper, outer portion of the buttock, the material injected and the needle promptly withdrawn. No massage is needed.

Herrell believes that patients who develop urticaria after penicillin are less likely to do so after using procaine penicillin.

The Treatment of Eczema

Question:

What simple, effective methods can one use in the treatment of eczema in babies and children? Are any of the recent proprietary ointments of special value? How can one quiet down the itching, scratching, nervous child (and its mother)?—M.D., Corvallis, Oregon.

Answer:

Eczema is more a matter of properly applying simple, standardized remedies than it is a succession of new, expensive medications. It has been said that the treatment of eczema is a matter of boric acid soaks, for the acute stage, and the use of coal tar in the chronic stage. A recent review offers practical suggestions for each stage, including the acute, "wet" eczema, the subacute and the chronic dry form.—H.H. Perlman of Philadelphia (*J. Pediatrics*) treats his pediatric patients thus: (*next page*)

The Treatment of Eczema (Cont.)

Rest is obtained by colloidal baths (starch, oatmeal or bran) which allays acute erythema and itching. Corn starch (Argo or Linit) is mixed with water and stirred with a spoon until milky white and then added to the tub. The skin should be patted, *not rubbed* dry. Kaolin, ¼ pound to 10 gallons of water, is soothing to a highly inflamed skin. Splinting of arms or handcuffs to prevent scratching and phenobarbital gr. ¼ to ½ every four hours aids in resting.

Cows milk, egg and wheat are common offenders in causing eczema. One should eliminate them from the diet and then add them, to see if a flare up occurs. Milk can be replaced by goats milk, Mull-Soy, Sobee and hypoallergic milks. The infants nutrition must however, be kept up, even if it means the feeding of an offending food.

Soap and water should not be used. Warm olive oil, sweet almond oil or sulfonated castor oil may be used to clean the skin.

In severe cases, the child should be transferred to a warmer climate or to a hospital, where recovery may be speedier (relief from parents?)

Local treatment: Wet stage may be treated by boric acid (2 per cent rather than the usual saturated or 4 per cent solution which cakes), Burow's solution or best chamomile tea (pour 1 quart of hot water on four heaping teaspoons of chamomile flowers, let stand for 10 minutes and strain through muslin) or potassium permangante 1:10,000 if secondary infection is present (one 0.3 Gm. Tablet dissolved in 3 quarts of water).

All wet packs should be made up of several layers of gauze (*not* cotton), kept continuously wet and use for 24 hours to 72 hours.

Subacute eczema may be treated by: Lassar's simple paste (℞ Zinc Oxide and starch 25 Gm. each, white petrolatum 50 Gm.); or Lassar's lotion (℞ Zinc oxide 15 Gm., talc 15 Gm., glycerin 20 Gm. and distilled water or 30 percent alcohol to 100 cc.); or (℞ Icthyol 2, coal tar solution (N.F.) 3, with or without 1/10 per cent menthol or ¼ per cent phenol, or both, to glycerin 20 and distilled water or alcohol to make 100 cc.); or zinc oil (℞ 40 parts of zinc oxide and 60 parts of olive oil).

Chronic eczema: Crude coal tar may be used in 3 to 6 percent in Lassars paste or may be painted directly upon the lesions full strength; solution of coal tar 5 to 10 per cent in simple shake lotion. Vioform 1.8, petrolatum 60.0 may be successful if the tars fail. Salicylic acid 3 to 10 per cent is added if necessary to remove thickened skin. Benadryl and Pyribenzamine help to relieve pruritus, but not as well as in urticaria.

Relief of Pain in Thoracic Aneurysm

Question:

I have a patient with an aneurysm of the ascending aorta, the pain of which is not relievable except by narcotics. His general health, otherwise, is fairly good. He is willing to have a surgical procedure performed. What procedure is the best to follow?—M.D., Savannah.

Answer:

A comparatively simple procedure is Babcock's operation for thoracic aneurysm. Under local anesthesia, a transverse incision is made in the neck, usually on the right side, about one and one-half inches above the clavicle. The sterno-mastoid muscle is cut across and the common carotid artery and internal jugular vein are dissected out and cleaned. Both vessels are ligated high up. Umbilical tapes are placed so as to control bleeding. The vessels are then cut across, just below the ligatures, and the heart ends are anastomose.

After slowing releasing the tapes, and seeing that the anastomosis is watertight, the wound is closed. Relief of pain occurs immediately. — F. T. Ransom, F.R.C.S., of Shanghai, China, reported 8 such cases in the *British Medical Journal* of November 1, 1947.

Development in the Infant and Young Adult

(A SIMPLIFIED SKELETAL X-RAY STUDY OF THE HAND)

For Use by the General Physician as an Index to Normal Development

PART I: MALES*

A COMMON question that confronts the pediatrician and general practitioner is this one: Is this baby, this child, or this youngster developing normally for his age? Is his bony growth and stature adequate or has it been delayed? Is serious disease affecting his growth? Will this youth develop further or are the epiphyses closed?

There is no really "simple method" that will answer all these questions automatically but guides may be furnished for comparison with the average.

By permission of Charles D. Flory, *Clinical Medicine* presents accurate sketches of tracings from original studies by the Society for Research in Child Development on the hands and wrists of hundreds of normal children.

These artists drawings, performed very ably by Ted Lozier, permit the comparison of x-rays of your patients with those of the approximate normals more readily than with reproductions of the x-rays themselves because of their clarity.

Obvious variations from the norm should be studied more thoroughly. Minor variations should not be considered too seriously until further x-rays have been made in 6 to 12 montths.

This study can be made by practically any physician in the United States, as x-rays can be made of the hand and wrist by the smallest machines available, including those of the neighborhood dentist.

Alert physicians might offer such a service on each succeeding birthday of their juvenile patients. Abnormal appearances of the epiphyses should suggest consultation with a studious pediatrician and roentgenologist, to rule out syphilis, rickets, scurvy, and other diseases.

Because of lack of space, the illustrations depicting the approximate normal of newborn males to the age of 19 will be published in this issue and those of newborn females to the age of 17 will be published in the coming issue. Both issues should be preserved in the x-ray room or on the physician's desk for ready comparison.

Roentgenologists and pediatricians have suggested that such studies by the average general practitioner will result in inaccurate and hurried diagnoses, on too little evidence. On the contrary, *anything that tends to make the physician think more about a patient will increase the study on that patient; thought on the part of the physician, and demand for consultations*—all highly desirable results. The general practitioner must again become a part of the medical team.

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* Part II: Females, to be published in the March, 1949, issue.

FIG. A. AGE STANDARD FOR NEWBORN MALES.

The carpal area of the average newborn male is entirely cartilaginous at birth. The metacarpals and phalanges are widely separated with no trace of epiphyseal centers. Nuclei for the capitatum and hamatum may be present in rare instances, such ossification is more frequent in female hands.

FIG. 1. AGE STANDARD FOR ONE-YEAR-OLD MALES.

The capitatum and hamatum have made their appearance in the typical hand by the twelfth month. Epiphyses may show up in the hand in a few instances but the typical boy has no epiphyses in the hand until after his first birthday.

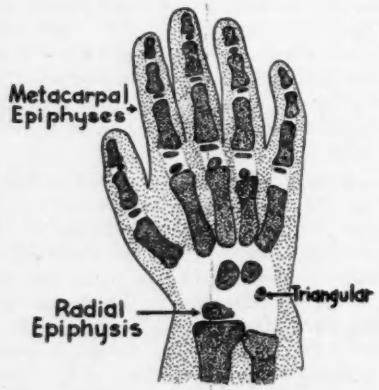

FIG. 2. AGE STANDARD FOR TWO-YEAR-OLD MALES.

The average boy has three carpal centers by his second birthday: capitatum, hamatum, and triquetrum. Many epiphyses appear between the twelfth and twenty-fourth months; quite significantly the radial epiphysis. Metacarpals II to V all have epiphyseal centers. Phalanges I in the proximal row, V in the middle row, and II and V in the distal row have no epiphyses in the typical cases. Phalanges III and IV in the distal row may or may not have epiphyseal centers by the twenty-fourth month. The radial epiphysis is already wedge-shaped.

FIG. 3. AGE STANDARD FOR THREE-YEAR-OLD MALES.

There is no increase in the number of carpal centers during the third year. All epiphyses, except the epiphysis on the ulna, should be present by the thirty-sixth month. There is an increase in the size of the bones which were already present at age two. The radial epiphysis is still small and wedge-shaped.

FIG. 4. AGE STANDARD FOR FOUR-YEAR-OLD MALES.

The lunatum has appeared by the fourth birthday. The metacarpal heads have increased in size but are still ball-like epiphyses. The radial epiphysis is thicker and larger with a more pronounced wedge-shape. The absence of any except the ulnar epiphysis at age four indicates retardation. The capitatum is oblong instead of round.

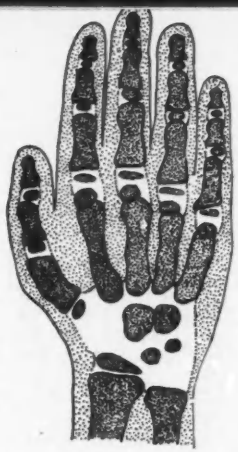

FIG. 5. AGE STANDARD FOR FIVE-YEAR-OLD MALES.

Four carpels, capitatum, hamatum, triquetrum, and lunatum, and the radial epiphysis are present in the average hands of five-year-old males. The naviculare may be just appearing in some cases. The radial epiphysis has increased in length but does not equal the width of the shaft. The saddle shape on the base of metacarpal II is not evident at age five. The metacarpal epiphyses may have started to take shape though they are still characteristically round.

FIG. 6. AGE STANDARD FOR SIX-YEAR-OLD MALES.

The naviculare is usually present at age six, while the m. majus and m. minus are just appearing. Since the order of appearance is not uniform, at least one of these centers should be present. The radial epiphysis has increased in size but the ulnar epiphysis is still absent. There is a first indication of the saddle-shape formation on the base of metacarpal II and a squaring off of metacarpal III. The metacarpal heads have begun to show D-shaped outlines. The epiphysis on metacarpal V is still round. All of the bones have increased in size.

FIG. 7. AGE STANDARD FOR SEVEN-YEAR-OLD MALES.

The ulnar epiphysis is present at age seven. All carpal bones except the pisiforms are present; the m. majus, m. minus, and naviculare are still quite small. The carpal area is dotted with bones though there is still much cartilage in the wrist. All of the metacarpal heads show a D-shaped flattening. The saddle-shaped outline on metacarpal II is more distinct. The radial epiphysis has increased in thickness and length.

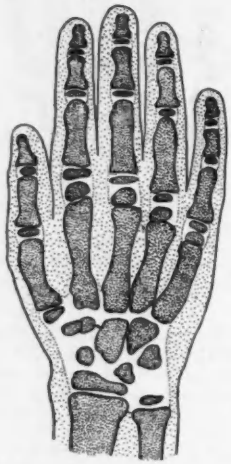

FIG. 8. AGE STANDARD FOR EIGHT-YEAR-OLD MALES.

The changes at eight are in size and quality of ossification. The saddle-shaped outline on metacarpal II is more mature than at age seven. There is a definite parallelism between the radial shaft and its epiphysis; the wedge-shapedness has disappeared. All epiphysis are distinctly separated from the shafts. Roundness instead of D-shaped outlines in metacarpal heads is an indication of retardation at age 8. The m. majus and m. minus shadows are likely to overlap.

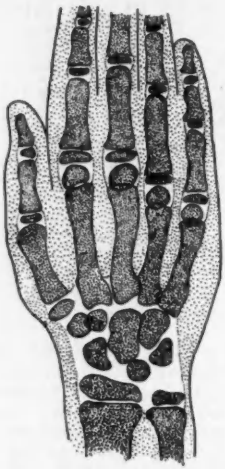

FIG. 9. AGE STANDARD FOR NINE-YEAR-OLD MALES.

All changes are qualitative except for the increase in size. There is a definite squaring off of the metacarpal heads on the ulnar side. The radial epiphysis extends toward the ulnar shaft (a beginning of what Todd calls the ulnar tongue). The radial epiphysis has thickened on the outer side and the gap between the shaft has been reduced. Carpal bones show the beginning of adult outlines; especially the capitatum and the naviculare. The triquetrum has become less round and more wedge-shaped. The base of metacarpal II is practically adult in shape. The ulnar epiphysis is still shorter than the width of the shaft.

FIG. 10. AGE STANDARD FOR TEN-YEAR-OLD MALES.

All changes are in size and quality. The triquetrum, lunatum, and naviculare are about equal in size; prior to this age the size was in the order named. All epiphyses are practically equal to the width of the bones to which they unite. Overlapping of carpal shadows is observed; especially with the m. majus and m. minus. Much of the cartilage has been penetrated by bone.

FIG. 11. AGE STANDARD FOR ELEVEN-YEAR-OLD MALES.

Significant changes are: increase in size, filling of open space, closer resemblance of the carpals to their adult outline, and an indication of density along the edges of the carpals. The differences between ten and eleven are the most difficult to detect. An increase in length and width of epiphyses is accompanied by a reduction in the epiphyseal gap. Over-lapping of bone shadows is to be expected. The carpal shadows may extend over the metacarpals and the radial epiphysis. The m. majus has definitely lost its roundness.

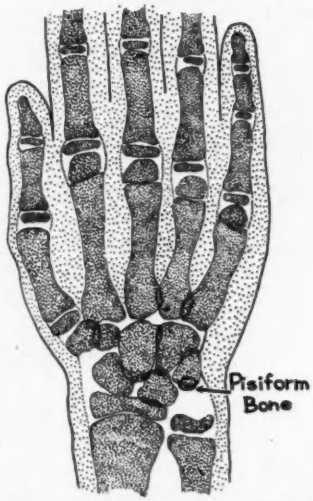

FIG. 12. AGE STANDARD FOR TWELVE-YEAR-OLD MALES

The pisiforme is present at age twelve. There is much overlapping of bone shadows. The carpal area is so full at age twelve that the ulnar epiphysis is the only ossified portion of the wrist which stands apart. All epiphyses show a definite parallelism with the bones to which they unite. Dense lines along the edges of the carpals are evident. The m. majus and hamatum typically cast their shadows over metacarpals II and V, respectively. The adult outlines are clear at this age.

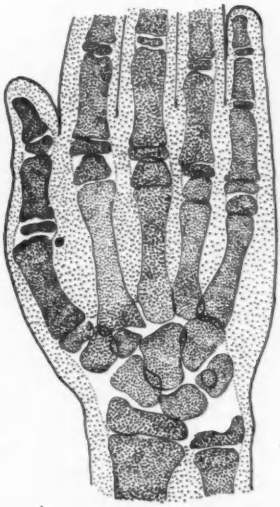

FIG. 13. AGE STANDARD FOR THIRTEEN-YEAR-OLD MALES.

The appearance of carpal bones has nothing to contribute after age twelve. Epiphyseal changes are the chief criteria of development during the teen ages. Signs of preparation for union are in evidence. The radial and ulnar epiphyses are still somewhat rounded at the edges, though the styloid process on the ulnar epiphysis and the radial beak are quite important. There is a close parallelism on the base of metacarpal I between the metacarpal and the epiphysis. A sesamoid should be just appearing at the distal end of metacarpal I; it is present in 50 per cent of the subjects.

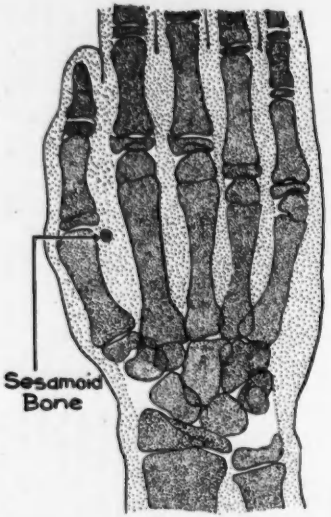

FIG. 14. AGE STANDARD FOR FOURTEEN-YEAR-OLD MALES

Lines between epiphyses and phalanges are very narrow. Metacarpal heads may appear to have begun union. There is a definite beak on the ulnar side of the radial epiphysis and a squared-offness on the outer side. The saddle shape in metacarpal II fits closely over the m. minus. Retardation is suggested if the sesamoid at the distal end of metacarpal I is absent.

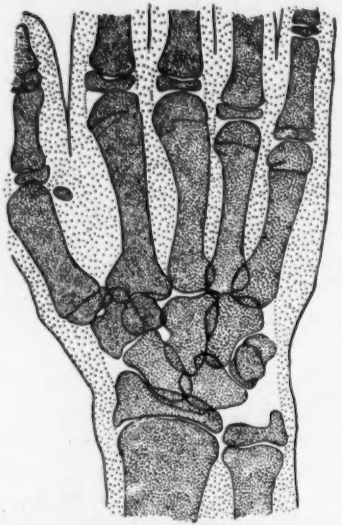

FIG. 15. AGE STANDARD FOR FIFTEEN-YEAR-OLD MALES.

The radial epiphysis has turned down on both sides of the shaft. Union is well along in the metacarpal heads. All epiphyseal lines are being reduced. The naviculare has come into close relationship with the radial epiphysis and seems to fit into a functional position. The radial and ulnar epiphyses are clearly not united. The carpal area is practically as full of bone at age fifteen as it is in the adult male hand. Final maturity involves merely the completion of epiphyseal fusion.

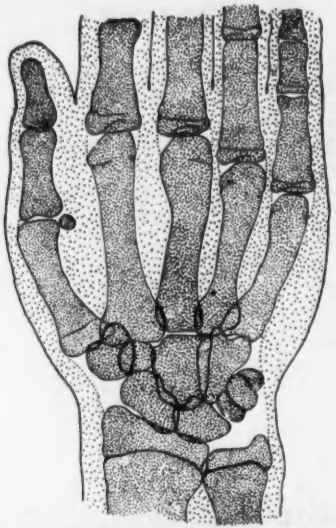

FIG. 16. AGE STANDARD FOR SIXTEEN-YEAR-OLD MALES.

The line of recent union for the epiphysis on the first metacarpal is usually still evident. Metacarpal heads and phalangeal epiphyses are in a state of recent or near union. There may be small gaps at the edges. Most of the open space between radial and ulnar shafts and their epiphyses has been filled. The sixteen-year-old male is in a state of development which indicates maturity within a few years.

FIG. 17. AGE STANDARD FOR SEVENTEEN-YEAR-OLD MALES.

Traces of union have nearly disappeared from the metacarpals and phalanges. Epiphyseal lines are usually still evident. The ulnar epiphysis is likely to have united on the radial side, but there is still a small opening at the outer edge. There has been a slight advance in development of the radial epiphysis but union has not yet been completed.

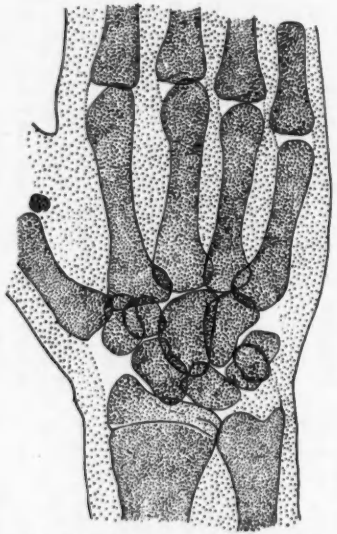

FIG. 18. AGE STANDARD FOR EIGHTEEN-YEAR-OLD MALES.

Traces of epiphyseal union have been lost in both the phalanges and metacarpals. The ulnar epiphysis has become a part of the shaft. There may still be a faint line of union along the radius which indicates the completion of fusion. In some instances, there may still be a slight gap at the very edge of the radial shaft. Final completion of ossification in the hand of the average male will not be delayed more than six months beyond the eighteenth birthday.

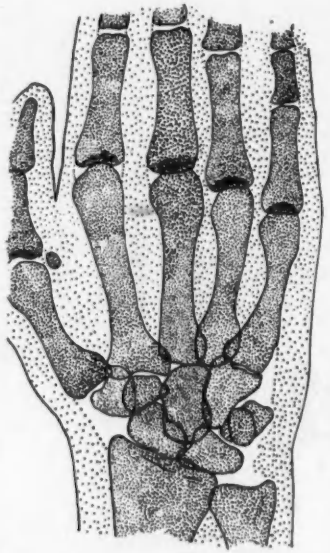

FIG. 19. AGE STANDARD FOR NINETEEN-YEAR-OLD MALES.

Average nineteen-year-old males have completed their skeletal development as judged by roentgenograms of the hand. Since some little evidence of recent union is present at age eighteen it seems safe to set eighteen and a half or 222 skeletal months as the time for skeletal maturation in the subjects studied.

Thumbnail Therapeutics

Oral Penicillin for Respiratory Infections

Oral penicillin medication with a palatable solution of soluble tablets of crystalline potassium penicillin G without buffers is a convenient and satisfactory method of treating respiratory infections in children. Adequate dosage must be used and failure of response in forty eight hours is an indication for increased dosage or change to parenteral penicillin. (Ed.: or to another antibiotic or to another type of therapy.) Therapeutic plasma levels can be obtained with doses of approximately 3000 units of penicillin per kilogram of body weight given every three hours. Infants under one year show higher levels than do older children probaby due to relatively poor renal function.—W. S. HOFFMAN, J. W. HOFER and H. GORDON; *Journ. Pediat.*, Jan. 1948.

Symptoms in Teen Age Girls

Girls between ages of 10 and 20 with menstrual irregularity, crampy pains, lassitude, inability to concentrate, amenorrhea and low blood pressure should be suspected of having hypothyroidism. Their basal metabolism is often as low as-25. Thyroid extract and iron orally, with occasionally anterior pituitary extract, oftens changes the whole outlook of these girls.—IVA C. YOUMANS, M.D. (Miami, Florida) in *Southern Med. J.*, Feb. 1948.

Diaper Rash

Mercuric chloride, in 1:4,000 solution, is an effective antiseptic against *B. ammoniagenes*, which causes the ammonia-like odor of diapers.—R. A. BENSON, M.D. et al in *J. Pediatrics*, Oct. 1947.

Tetraethylammonium for Pain

Obstinate pain from causalgia, herpes zoster, Buerger's disease (thromboangiitis obliterans) and thrombophlebitis can be alleviated by the slow intravenous injection of tetraethylammonium 1 to 5 cc. of a ten per cent solution.—F. V. COLLER, M.D., University of Michigan School of Medicine, Ann Arbor, Michigan.

Toxemia of Pregnancy

Absolute rest in bed, sedation, restriction of the sodium ion in patients with edema and interruption of pregnancy is necessary. These are the essentials in the toxemia of pregnancy. If we put the patient to bed, administer generous amounts of sedative, and interrupt pregnancy after a few days, in all but the mildly ill, we have accomplished everything possible. We give sufficient fluids either by mouth or by vein — 1,500 to 2,500 cc to replace daily loss only.

In former years, overloading of patients with fluid resulted in four deaths from pulmonary edema and one death from cerebral edema.— Wm. F. MENGERT, M.D., in *Southern Med. Jrnl. Nov.*, 1947.

Chest Pains and Exercise

"Any pain within 2 feet of the heart which is induced by exercise and relieved by rest is angina pectoris" (Cabot). Pain in the chest simulating angina pectoris may be due to vertebral conditions (which also may be brought on by exercise and relieved by rest) or hernia around the cardiac end of the stomach.—C. C. STURGIS, M.D., in *Hawaii M. J.*, July-Aug. 1947.